

IN THE CLAIMS

1. (Original) A pseudo-random number sequence output unit responsive to s ($1 \leq s$) number of prescribed positive integers q_1, q_2, \dots, q_s , a prescribed real impulse constant r ($-1 < r < 1$), a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1 \leq N$), which output unit comprises:

an input acceptance section that accepts input of s ($1 \leq s$) number of real number sequence initial values Y_1, Y_2, \dots, Y_s ($-1 < Y_1 < 1, -1 < Y_2 < 1, \dots, -1 < Y_s < 1$), and s number of integer parameters p_1, p_2, \dots, p_s ($2 \leq p_1, 2 \leq p_2, \dots, 2 \leq p_s$) for which $q_1 \bmod p_1 \neq 0, q_2 \bmod p_2 \neq 0, \dots, q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers q_1, q_2, \dots, q_s ;

a calculation section that uses the prescribed real impulse constant r , the prescribed non-zero real constant C , the sequence initial values Y_1, Y_2, \dots, Y_s , the integer parameters p_1, p_2, \dots, p_s , the prescribed positive integers q_1, q_2, \dots, q_s and integers j ($1 \leq j \leq s$), m ($1 \leq m \leq 2N-2$) and n ($1 \leq n \leq 2N-1$) to calculate from the recurrence formula

$$T_p(\cos\theta) = T(p, \cos\theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^s T(q_j, y_j[n])$$

a pseudo-random number sequence $z'[1], z'[2], \dots, z'[N]$ of length N that satisfies

$$z'[1] = C \sum_{j=1}^N (-r)^j z[j],$$

$$z'[2] = C \sum_{j=1}^N (-r)^j z[j+1],$$

$$z'[N] = C \sum_{j=1}^N (-r)^j z[j + N - 1]; \text{ and}$$

an output section that outputs the pseudo-random number sequence $z'[1], z'[2], \dots, z'[N]$.

2. (Original) The output unit according to claim 1, wherein the sequence initial values Y_1, Y_2, \dots, Y_s satisfy

$$y_k[2] = T(P_k, Y_k)$$

$$y_k[m + 1] = T(P_k, y_k[m])$$

$$Y_k = y_k[N+1] = T(P_k, y_k[N])$$

with respect to an integer k ($1 \leq k \leq s$) and an integer m ($1 \leq m \leq N$).

3. (Original) The output unit according to claim 1 or 2, wherein the prescribed real impulse constant r satisfies

$$2 - \sqrt{3} - 0.1 \leq r \leq 2 - \sqrt{3} + 0.1.$$

4. (Currently Amended) The output unit according to ~~any of claims 1 to 3~~ claim 1, wherein every prescribed positive integer $q_1, q_2 \dots q_s$ is 1.

5. (Currently Amended) A transmitter, comprising:
 an input acceptance section that accepts a signal for transmission;
~~an~~ the output unit of ~~any of claims 1 to 4~~ claim 1 that outputs a pseudo-random number sequence of length N ;

a spreading section that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted; and

a signal transmitting section that transmits the spectrum-spread signal.

6. (Original) The transmitter according to claim 5, further comprising:

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N.

7. (Original) The transmitter according to claim 5, further comprising:

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N.

8. (Currently Amended) A receiver, comprising[[]]:

a signal receiving section that receives a signal;

an the output unit of ~~any of claims 1 to 4~~ claim 1 that outputs a pseudo-random number sequence of length N;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to ~~inversely spectrum-spread~~ despread the received signal; and
an output section that outputs the inversely spectrum-spread signal as a signal for transmission.

9. (Original) The receiver according to claim 8, further comprising:

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N .

10. (Original) The receiver according to claim 8, further comprising:

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N .

11. (Currently Amended) A communication system, comprising:

~~the (1) a transmitter of claim 6 including~~

an input acceptance section that accepts a signal for transmission;

the output unit of claim 1 that outputs a pseudo-random number sequence of length N;

a spreading section that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted;

a signal transmitting section that transmits the spectrum-spread signal;

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N; and

the (2) a receiver of claim 10 including

a signal receiving section that receives a signal;

an output unit of claim 1 that outputs a pseudo-random number sequence of length N;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to despread the received signal;

an output section that outputs the inversely spectrum-spread signal as a signal for transmission; and

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ;

the output unit accepting input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N ;

the receiver receiving sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s transmitted by the transmitter; and

the receiver also receiving a signal transmitted by the transmitter.

12. (Currently Amended) A communication system, comprising:

the (1) a transmitter of claim 7 including

an input acceptance section that accepts a signal for transmission;

the output unit of claim 1 that outputs a pseudo-random number sequence of length N ;

a spreading section that uses the output pseudo-random number sequence of length N as a spreading code to spectrum-spread the signal for transmission whose input was accepted;

a signal transmitting section that transmits the spectrum-spread signal; and

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ,

the output unit accepting input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N ; and

the (2) a receiver of claim 9 including

a signal receiving section that receives a signal;

the output unit of claim 1 that outputs a pseudo-random number sequence of length N ;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to despread the received signal;

an output section that outputs the inversely spectrum-spread signal as a signal for transmission;

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ,

the output unit accepting input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and outputting a pseudo-random number sequence of length N;

the transmitter receiving sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s transmitted by the receiver; and

the receiver receiving a signal transmitted by the transmitter.

13-25. (Canceled)

26. (Currently Amended) A computer-readable data recording medium recorded with a program that enables a computer to function as an output unit ~~output unit~~ responsive to s ($1 \leq s$) number of prescribed positive integers $q_1, q_2 \dots q_s$, a prescribed real impulse constant r ($-1 < r < 1$), and a prescribed non-zero real constant C for outputting a pseudo-random number sequence of length N ($1 \leq N$), which output unit comprises:

an input acceptance section that accepts input of s ($1 \leq s$) number of real number sequence initial values Y_1, Y_2, \dots, Y_s ($-1 < Y_1 < 1, -1 < Y_2 < 1, \dots, -1 \leq Y_s < 1$), and s number of integer parameters p_1, p_2, \dots, p_s ($2 < p_1, 2 \leq p_2, \dots, 2 \leq p_s$) for which $q_1 \bmod p_1 \neq 0, q_2 \bmod p_2 \neq$

$0 \dots, q_s \bmod p_s \neq 0$ respectively hold with respect to the prescribed positive integers $q_1, q_2 \dots q_s$;

a calculation section that uses the prescribed real impulse constant r , the prescribed non-zero real constant C , the sequence initial values Y_1, Y_2, \dots, Y_s , the integer parameters p_1, p_2, \dots, p_s , the prescribed positive integers $q_1, q_2 \dots q_s$ and integers j ($1 \leq j \leq s$), m ($1 \leq m \leq 2N-2$) and n ($1 \leq n \leq 2N-1$) to calculate from the recurrence formula

$$T_p(\cos\theta) = T(p, \cos\theta) = \cos(p\theta)$$

$$y_j[1] = Y_j$$

$$y_j[m+1] = T(p_j, y_j[m])$$

$$z[n] = \prod_{j=1}^s T(q_j, y_j[n])$$

a pseudo-random number sequence $z'[1], z'[2], \dots, z'[N]$ of length N that satisfies

$$z'[1] = C \sum_{j=1}^N (-r)^j z[j]$$

$$z'[2] = C \sum_{j=1}^N (-r)^j z[j+1]$$

$$z'[N] = C \sum_{j=1}^N (-r)^j z[j+N-1]; \text{ and}$$

an output section that outputs the pseudo-random number sequence $z'[1], z'[2], \dots, z'[N]$.

27. (Original) The data recording medium according to claim 26, whose program operates the computer to function so that the sequence initial values Y_1, Y_2, \dots, Y_s satisfy

$$y_k[2] = T(P_k, Y_k)$$

$$y_k[m+1] = T(P_k, y_k[m])$$

$$Y_k = y_k[N+1] = T(P_k, y_k[N])$$

with respect to an integer k ($1 \leq k \leq s$) and an integer m ($1 \leq m \leq N$).

28. (Currently Amended) The data recording medium according to ~~claims 26 or 27~~
claim 26, whose program operates the computer to function so that the prescribed real
impulse constant r satisfies

$$2 - \sqrt{3} - 0.1 \leq r \leq 2 - \sqrt{3} + 0.1.$$

29. (Currently Amended) The data recording medium according to ~~any of claims 26~~
~~to 28~~ claim 26, whose program operates the computer to function so that every prescribed
positive integer $q_1, q_2 \dots q_s$ is 1.

30. (Currently Amended) A computer-readable data recording medium recorded
with a program that enables a computer to function as a transmitter, comprising:
an input acceptance section that accepts a signal for transmission;
an output unit of ~~any of claims 1 to 4~~ claim 1 that outputs a pseudo-random number
sequence of length N ;
a spreading section that uses the output pseudo-random number sequence of length N
as a spreading code to spectrum-spread the signal for transmission whose input was accepted;
and
a signal transmitting section that transmits the spectrum-spread signal.

31. (Original) The data recording medium according to claim 30, whose program
further operates the computer to function as:

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

operates the output unit to accept input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and output a pseudo-random number sequence of length N .

32. (Original) The data recording medium according to claim 30, whose program further operates the computer to function as:

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

operates the output unit to accept input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and output a pseudo-random number sequence of length N .

33. (Currently Amended) A computer-readable data recording medium recorded with a program that enables a computer to function as a receiver comprising:

a signal receiving section that receives a signal;

an output unit of ~~any of claims 1 to 4~~ claim 1 that outputs a pseudo-random number sequence of length N ;

an inverse spreading section that uses the output pseudo-random number sequence of length N as a spreading code to ~~inversely spectrum-spread~~ despread the received signal; and

an output section that outputs the inversely spectrum-spread signal as a signal for transmission.

34. (Original) The data recording medium according to claim 33, whose program further operates the computer to function as:

a selecting section that selects sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

a parameter transmitting section that transmits the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

operates the output unit to accept input of the selected sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and output a pseudo-random number sequence of length N .

35. (Original) The data recording medium according to claim 33, whose program further operates the computer to function as:

a parameter receiving section that receives sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s ; and

operates the output unit to accept input of the received sequence initial values Y_1, Y_2, \dots, Y_s and integer parameters p_1, p_2, \dots, p_s and output a pseudo-random number sequence of length N .

36. (Canceled)

37. (Currently Amended) A data recording medium according to ~~any of claims 26 to 36~~claim 26, wherein the data recording medium is a compact disk, floppy disk, hard disk, magneto-optical disk, digital video disk, magnetic tape, or semiconductor memory.